



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

JAN 12 2005

OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

David E. Holliday, Lt. Col., CM, USA  
Commander

Don E. Barclay  
UMCDF Site Project Manager

Douglas G. Hamrick  
Washington Demilitarization Company  
Project General Manager  
Umatilla Chemical Agent Disposal Facility  
78072 Ordnance Road  
Hermiston, Oregon 97838

Gentlemen:

This is in response to your letter dated December 10, 2004, proposing: to assign a PCB concentration of 2006 ppm in matted shipping and firing tubes of the M55 Chemical Agent Rockets during emission testing related to PCBs, and; to specify a nominal value of 591 ppm PCB for all tubes in the UMCDF stockpile to comply with Conditions 5.a and 5.b of the National Approval to Destroy Polychlorinated Biphenyls (Permit) issued June 6, 2002.

The Permit requires UMCDF to achieve 99.9999% destruction and removal efficiency (six 9s DRE) during PCB disposal operations. UMCDF proposes to use a concentration of 2006 ppm PCBs for the matted rocket shipping and firing tubes for the purpose of calculating the Destruction and Removal Efficiency (DRE). UMCDF intends to segregate rockets encased in matted tubes from the stockpile and process only matted tube rockets during the TSCA shakedown tests and the Trial Burn. The assessment which determined the PCB level to be used during the testing is based on 1986-1987 reports on studies performed by the Army (Reports) of the PCB contents of rockets in the nation's stockpile. M55 Rockets contain tubes with three types of material, matted fiberglass, chopped fiberglass and matted fiberglass with surface coating. Of the more than 2000 rockets sampled and analyzed in the Report, nineteen of them originated from UMCDF. Of these, twelve had chopped fiberglass and the remaining seven contained matted fiberglass. The matted tubes averaged 2306 ppm PCBs.

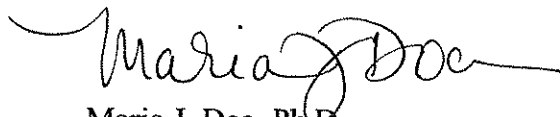
Based on results of the Reports, NPCD designated the mean concentration for the matted-tube rockets in the nation's stockpile to be 1966 ppm PCBs. The statistical standard error in calculating the mean was 40 ppm PCBs. To account for the standard error, UMCDF proposed the sum value of 2006 ppm PCB. This agrees generally with the 2306 ppm PCBs in the rockets sampled in the Report. Therefore, NPCD concurs with the proposed value of 2006 ppm PCBs to be applied for calculation of DREs during PCB emission monitoring for DRE.

The Permit also requires UMCDF to monitor and record the rate and total quantity of PCBs disposed of in the Deactivation Furnace System. UMCDF proposed a nominal value of 591 ppm PCBs to be used for monitoring and record keeping. The procedure which resulted in the 591 ppm value is found in Enclosure 2 of your letter. Twenty five rocket storage igloos were selected for surveying, eliminating igloos which contained VX agent, potentially solidified chemical agent, and leaking warheads. Three of the twenty five igloos were eliminated from consideration because they contained only chopped fiberglass tubes. The chopped-tube rockets are to be used during shakedown operations. A nominal value of 25 ppm PCBs was assigned to the chopped-tube rockets, based on the analytical results of the twelve UMCDF chopped-tube rockets described in the Report. The average value of PCBs for the tubes in the remaining igloos was 591 ppm.

NPCD disagrees with usage of the 591 ppm PCBs as a nominal value. A nominal value should be representative of the population in consideration. By removing the three igloos from population of igloos, the 591 ppm value is no longer representative. NPCD understands that UMCDF has been using the value of 25 ppm PCBs for chopped-tube rockets since the inception of operations. To alleviate the complication of converting PCB quantity already recorded during shakedown operations and because only two weeks of shakedown operations remain prior to PCB DRE testing, NPCD authorizes UMCDF to continue to use 25 ppm for chopped-tube rockets. UMCDF may continue to use 25 ppm PCBs for processing of chopped-tube rockets until the initial operation for testing for PCB DRE. Thereafter, UMCDF shall use 521 ppm PCBs as the nominal value. The 521 ppm value is the average PCB content of rocket tubes in all 25 igloos surveyed.

Please contact Hiroshi Dodohara, at (202) 566-0507, for any technical questions regarding this correspondence.

Sincerely,

A handwritten signature in cursive script, appearing to read "Maria J. Doa".

Maria J. Doa, Ph.D.

Director

National Program Chemicals Division

cc: PCB Coordinator -  
Regions IV, VI, VIII

Dan Duncan -  
Cathy Massimino -  
EPA Region X

Mr. Dennis Murphy  
Oregon Department of  
Environmental Quality

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Sincerely,

Maria J. Doa, Ph.D.  
Director  
National Program Chemicals Division

cc: PCB Coordinator -  
Regions IV, VI, VIII

Dan Duncan -  
Cathy Massimino -  
EPA Region X

Mr. Dennis Murphy  
Oregon Department of  
Environmental Quality

U.S. ENVIRONMENTAL PROTECTION AGENCY  
OFFICE OF POLLUTION PREVENTION AND TOXICS  
WASHINGTON, DC 20460

PLEASE PRINT IN BLACK INK ONLY

TO: *Gus Aljura*

OFFICE PHONE:

DATE: *1-12-05*

ORGANIZATION:

FROM: FIBERS & ORGANICS BRANCH

Mail Code 7404T

/ / TONY BANEY	566-0497	/ / SARA MCGURK	566-0480
/ / SHEILA CANAVAN	566-1978	/ / PEGGY REYNOLDS	566-0513
/ / LAURA CASEY	566-1982	/ / TOM SIMONS	566-0517
/ / ROBERT COURTNAGE	566-1081	/ / JOHN SMITH	566-0512
/ / SELWYN COX	566-0496	/ / LINDA STRAUSS	566-1973
<i>X</i> / / HIROSHI DODOHARA	566-0507	/ / JACK PRIMACK	566-0499
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Notes:

PLEASE NUMBER EACH PAGE

Page 1 of *3* with cover sheet

# ROUTING SLIP

#	NAME	ACTION	INITIAL	DATE
1	Hiroshi Dodohara	Originator	HD	12/28/04
2	Tony Baney	Concur	TB	1/7/05
3	John Schwemberger	Concur	JGS	1/7/05
4	Brian Symmes	Concur		
5	Maria Doa	Sign	MD	1/11/04
6	Pat Robinson	Administrative	PR	1/7/05
7				
8				
9				

## Nature of Item Being Routed:

Letter authorizing Umatilla Chemical Agent Disposal Facility to use 2006 ppm PCBs level in rocket tubes for DRE calculations and a nominal value of 521 ppm for monitoring and record keeping.

FROM:

H. Dodohara

DATE

12/28/04

TELE #

566-0507

ROOM #

EPA East 4353QQ



DEPARTMENT OF THE ARMY  
US ARMY CHEMICAL MATERIALS AGENCY  
UMATILLA CHEMICAL AGENT DISPOSAL FACILITY  
78072 ORDNANCE ROAD  
HERMISTON, OREGON 97838  
DEC 10 2004

US Army Chemical Materials Agency  
UMCDF Field Office

ENV-04-0365

SUBJECT: Umatilla Chemical Agent Disposal Facility (UMCDF) Hazardous Waste Permit (ORQ 000 009 431) – Proposed Polychlorinated Biphenyl (PCB) Concentrations in Matted Shipping and Firing Tubes and a Nominal PCB Concentration

Maria J. Doa, Director  
National Programs Chemical Division  
MC 7404, EPA East Building, Room 4355A  
1201 Constitution Avenue  
Washington, DC 20004

Dear Ms. Doa:

References:

- a. Letter, UMCDF, ENV-04-0146, May 27, 2004, subject: Prior Written Notice for Conducting a Permitted Disposal Activity and Request for Authorized Operations.
- b. Letter, United States Environmental Protection Agency, July 9, 2004, subject: Letter Authorizing UMCDF to begin PCB Disposal Operations on July 17, 2004.

The letter formally proposes a concentration of 2,006 parts per million (ppm) PCBs for each GB M55 Rocket matted M441 shipping and firing (S&F) tube incinerated during emissions testing for the purposes of demonstrating the required 99.9999% PCB destruction and removal efficiency (DRE). This letter also proposes the use of 591 ppm PCBs as a “nominal value” the concentration in the GB M55 Rocket S&F tubes during the shakedown, post-trial burn, and normal operational periods, with the exception of the DRE demonstration testing periods.

a. **Matted S&F Tube Concentration**

Due to the accepted limitations of the approved analytical method, it is imperative that S&F tubes with elevated PCB concentrations be used during the emissions testing periods to demonstrate with a high level of confidence the Toxic Substances Control Act (TSCA)-required 99.9999% PCB DRE. The GB M55 Rocket S&F tubes stored at the Umatilla Chemical Depot (UMCD) include three types of tubes: chopped, matted, and matted/coated. In 1986-1987, the U.S. Army Environmental Hygiene Agency conducted a study titled “Hazardous Waste Study No. 37-26-1345-86. Assessment of the Occupational Health, Environmental and Regulatory Impact of Polychlorinated Biphenyls Contained in M441 Shipping and Firing Tube.” Part of the assessment included the sampling and PCB analysis of more than 2,000 S&F tubes primarily from the Tooele Army Depot (TEAD). Enclosure 1 contains a summary of the three phases of



the assessment, a summary of the statistical analysis conducted for the Pine Bluff Chemical Agent Disposal Facility (PBCDF), and the recommendation for the use of 2,006 ppm PCBs for matted S&F tubes for the purposes of demonstrating the required DRE. Therefore, it is proposed to assign matted S&F tubes with a concentration of 2,006 ppm.

**b. Establishing a "Nominal PCB Concentration"**

Conditions 5.a and 5.b in the TSCA permit require the UMCDF to monitor and record the rate and quantity of PCBs fed into the DFS utilizing a nominal value of 1,247 ppm PCBs for each M55 rocket. The Notice to Dispose of PCBs (as required per Condition 1.a), submitted to the National Programs Chemical Division on May 27, 2004 (reference a), identified the PCB concentrations for the specific type of S&F tubes. Chopped tubes were designated with a PCB concentration of 25 ppm (not regulated). The matted tubes were designated with a PCB concentration of 2,800 ppm (regulated) and the matted/coated tubes were designated with a PCB concentration of 6,441 ppm (regulated). This was based on the approach that the UMCDF would differentiate between the tubes being incinerated and document in the operating record the quantity of PCBs per tube. Subsequent evaluation of this approach has determined that it would significantly facilitate operations at the UMCDF to assign a "nominal PCB concentration" regardless of the type of tube being incinerated. The use of a "nominal PCB concentration" would streamline efficiency, improve recordkeeping, and decrease operating cost. Enclosure 2 contains a statistical analysis of the PCB concentration in a GB M55 S&F tube based on a tube-type inventory of over 50% of the stored tubes at the UMCDF. The result of the statistical analysis recommends a nominal PCB concentration of 591 ppm. The analysis did not take into account three storage igloos that contained all chopped S&F tubes (not regulated) since the tubes are currently planned to be destroyed by the end of 2004 or early 2005.

Therefore, it is proposed to utilize a nominal PCB concentration of 591 ppm during shakedown, post-trial burn, and normal operating periods, with the exception of periods when DRE emissions testing is being conducted and the chopped S&F tubes contained in the three igloos scheduled for destruction by the end of 2004 or early 2005. A request for a nominal PCB concentration for VX S&F tubes, based on a representative tube type inventory, will be submitted separately, prior to the commencement of the VX rocket campaign.

Additionally, Enclosure 3 contains updated information required by Condition 1.a.(2).C regarding the estimates of the amount and type of PCB to be treated and estimates of the concentration of PCBs in the material. The information submitted in the referenced letter has been modified based on the use of a nominal PCB concentration of 591 ppm.

An expeditious review and decision of the proposed matted S&F tube concentration, as well as the proposed "nominal PCB concentration" is requested in order to support the TSCA shakedown tests scheduled to be conducted in early January 2005.

If you have any questions, please call our technical point of contact, Mr. Michael Strong,  
(541) 564-7058.

Sincerely,

Date of Signature: 9 Dec 04

David E. Holliday  
Lieutenant Colonel, CM, USA  
Commander

\*CERTIFICATION STATEMENT

Date of Signature: 9 Dec 04

Don E. Barclay  
UMCDF Site  
Project Manager

\*CERTIFICATION STATEMENT

Date of Signature: 12/8/04

Douglas G. Hamrick  
Washington Demilitarization Company  
Project General Manager

\*CERTIFICATION STATEMENT

Enclosures

\*I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION ACCORDING TO A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

Copies Furnished:

Ms. Cathy Massimino (WCM-127), U.S. Environmental Protection Agency, Region 10,  
1200 Sixth Avenue, Seattle, Washington 98101  
Mr. Hiroshi Dodohara, U.S. Environmental Protection Agency, Fibers and Organics Branch, MC  
7404T, Ariel Rios Building, 1200 Pennsylvania Avenue, N.W., Washington D.C. 20460  
Mr. Dan Duncan, U.S. EPA, Region 10, 1200 Sixth Avenue, Seattle, Washington 98101  
Mr. Dennis Murphey, Oregon Department of Environmental Quality, 256 East Hurlburt Avenue,  
Suite 105, Hermiston, Oregon 97838

## **Enclosure 1**

### **PCB Concentration in UMCDF GB Rockets**

## **PCB CONCENTRATION IN UMCDF GB ROCKETS**

### **INTRODUCTION**

The purpose of this write-up is to summarize the information provided in the U.S. Army Environmental Hygiene Agency (AEHA) study conducted in 1986-1987 in order to ascertain the best justifiable approach for establishing the Polychlorinated Biphenyls (PCBs) concentration for matted M441 shipping and firing tubes in support of the Deactivation Furnace System (DFS) GB Rocket Trial Burn. This document also summarizes the statistical analysis conducted by the National Programs Chemical Division (NPCD), known as the "TSCA Office", for establishing PCB concentrations for matted tubes at the Pine Bluff Chemical Agent Disposal Facility (PBCDF).

### **PRELIMINARY REPORT**

1. In January 1986, AEHA issued a "Preliminary Report Assessment of the Occupational Health Environmental and Regulatory Impact of Polychlorinated Biphenyls (PCBs) Contained in the M441 Shipping and Firing Tube." The task involved visiting the depots at Tooele, Umatilla, Anniston, Johnston Island, Pine Bluff, and Lexington and collect and analyze samples to evaluate the PCB exposures.
2. Conclusions from the preliminary report indicated that
  - a. matted fiberglass M441 shipping and firing tubes contain PCBs. Approximately 50% of the tubes analyzed contain PCB with the highest level detected being 4,400 ppm.
  - b. Chopped fiberglass M441 shipping and firing tubes are not contaminated with PCB and therefore not regulated.
3. Appendix A (Summary of Laboratory Data) stated that 85 shipping and firing tubes were analyzed. PCBs were not detected in any of the chopped tubes. The matted (unpainted) tubes either were non-detect for PCBs or contained a range between 1,500 – 4,400 ppm PCBs.
4. Appendix A Task 5 tabulates the Rocket Tube Analysis conducted on 53 tubes from different depots. Of the 53 samples, 19 were from the Umatilla stockpile. 12 of the 19 UMCD samples were chopped with a concentration less than 25 ppm. The remaining seven UMCD samples were from matted shipping and firing tubes with the following concentrations:

**TABLE 1: UMCDF Tube PCB Concentration**

<b>No.</b>	<b>Rocket Lot No.</b>	<b>Tube PCB Concentration (ppm)</b>
102U1	1033-32-149	1,820
110U1	1033-43-148	1,610
102U2	1033-32-149	2,330
127U1	Not Available	1,380
127U2	Not Available	3,000
128U1	1033-53-1058	2,100
112U1	1033-45-179	3,900
Average		2,306

Note: These matted tubes underwent the thermal decontamination process (350°F for four hours) prior to analysis.

5. Appendix C of the Preliminary Report contains the CAMDS DFS Trial Burn Plan. Appendix E of the Trial Burn Plan includes results from testing done on two sets of tubes from Tooele. The first group of tubes had been heat treated in a vacuum oven at 350°F for four hours as an agent decontamination procedure (Table 2). The second group of tubes had not been heat-treated (Table 3). The results were handled separately since it was felt that the heat treatment could possibly affect surface PCB levels. Testing of the tubes included analysis of PCBs of the surface layer of the tube and of the entire composite layer.
6. Conclusions:
  - None of the chopped tubes contained PCBs in either group.
  - A little less than 50% of the matted tubes contained PCBs in the total composite and surface layers.

**TABLE 2: Tubes Heat-Treated in Vacuum Oven for 4 Hours**

Tube Type	No. Studied	<25 ppm	>25 ppm	PCB Surface Content (ppm)		Total PCB Content (ppm)	
				Range	Mean	Range	Mean
Chopped	22	22	0	--	--	--	--
Matted	30	7	23	629-4,290	3,007 (2,311)	501-3,480	2,592 (1,993)
Matted/Coated	1	0	1	--	15,200	--	350
Total	53	29	24				

NOTE: The "mean" listed for the matted tubes only include the tubes that measure >25 ppm. It does not include the tubes that measured <25 ppm. The values presented in parenthesis are the values calculated using 25 ppm PCBs for the matted tubes that measured <25 ppm PCBs.

**TABLE 3: Non Heat-Treated Tubes**

Tube Type	No. Studied	<25 ppm	>25 ppm	PCB Surface Content (ppm)		Total PCB Content (ppm)	
				Range	Mean	Range	Mean
Chopped	2	2	0	--	--	--	--
Chopped-Coated	3	3	0				
Matted	9	5	4	1,890-4,390	2,800 (1,258)	1,960-3,210	2,528 (1,137)
Matted/Coated	20	10	10	1,750-12,800	6,441 (3,233)	262-5,380	1,864 (945)
Total	34	20	24				

NOTE: The "mean" listed only include the tubes that measure >25 ppm. It does not include the tubes that measured <25 ppm. The values presented in parenthesis are the values calculated using 25 ppm PCBs for the matted and matted/coated tubes that measured <25 ppm PCBs.

### **PHASE 1 HAZARDOUS WASTE STUDY**

1. In June 1986, Phase 1 "Hazardous Waste Study No. 37-26-1345-86. Assessment of the Occupational Health, Environmental and Regulatory Impact of Polychlorinated Biphenyls Contained in M441 Shipping and Firing Tube" was issued. This study has similar information as presented in the Preliminary Report. Appendix E of this study is the Laboratory Analysis which includes Tables E-1 through E-4 which are the same tables as those presented above.

### **PHASE 2 HAZARDOUS WASTE STUDY**

1. In September 1986, Phase 2 "Hazardous Waste Study No. 37-26-1345-86. Assessment of the Occupational Health, Environmental and Regulatory Impact of Polychlorinated Biphenyls Contained in M441 Shipping and Firing Tube" was issued. The task of Phase 2 was to determine the environmental and regulatory impact from the incineration of PCB contaminated materials in the CAMDS DFS.
2. Section 7 of the report "Shipping and Firing Tube Analysis" states the following:
  - a. "Of the 147 chopped shipping and firing tubes samples analyzed, only 3 of the samples contained PCBs at a concentration greater than or equal to 50 ppm....94.9% of the chopped shipping and firing tubes contain PCBs at concentrations less than 50 ppm with a 95% confidence." This section refers to the Preliminary Report which supported this claim. I don't believe we have the final Preliminary Report issued.
  - b. "Using both surface scrape and cross-sectional samples, no statistically significant difference of PCB concentration was found among the samples taken at different locations along the tube. Therefore, the sampling location on the tube was immaterial."

- c. "The surface scrape technique is the preferred method for obtaining a sample using the linear relationship in Figure 10, the concentration of PCBs determined from the surface scrape can then be related to a composite concentration of PCBs in the tube."
- d. For the Trial Burn Test Feed Analysis, 1,000 matted tubes were sampled in order to identify a sufficient number of tubes for the test. The analytical results were similar to the preliminary report which indicated that 47% were <25 ppm, 0.4% were between 51-1,999 ppm, and 52.6% were >2,000 ppm. For the Trial Burn, CAMDS only fed tubes that were greater than 2,000 ppm PCBs.

### 3. CONCLUSION

- a. "The bimodal distribution of PCB concentration for the samples of the M441 shipping and firing tubes makes characterization of the PCB feed based on sample statistics difficult and unreliable. Therefore, the PCB feed rates for future trial burns would have to be developed based on total sampling of the feed items...the small gains in information that may be achieved by this type of program do not appear to outweigh the safety implication of the extra handling of the M55 rockets."
- b. Table L-1 contains a tabulation of the 1,000 matted shipping and firing tube samples analyzed.
- c. No averages or means were established since the purpose of the analysis were to identify tubes >2,000 ppm to be treated in the Trial Burn.

### **PHASE 3 HAZARDOUS WASTE STUDY**

1. In March 1987, Phase 3 "Hazardous Waste Study No. 37-26-1345-86. Assessment of the Occupational Health, Environmental and Regulatory Impact of Polychlorinated Biphenyls Contained in M441 Shipping and Firing Tube" was issued. This was the final report of the entire assessment.
2. Section 5 states, "Since the March 1986 incineration testing at CAMDS, an additional 1,000 scrape samples have been obtained from shipping and firing tubes at TEAD and have been analyzed by IT Corp." The following summarizes the sequence of sampling conducted in the assessment:
  - The first group consisted of 53 samples from tubes that had been decontaminated for agent GB. From the analysis of the first 10 samples, the data indicated that all of the chopped tube samples were <25 ppm and three out of three matted tube samples contained PCBs.
  - From the 53 samples, all chopped tubes were less than 25 ppm PCBs. Some of the matted tubes contained PCBs <25 ppms. After this group of samples were analyzed, the effect of thermal decontamination of the shipping and firing tubes was examined and the process was found to have an impact on the measured PCB concentration. As part of this study, an additional 34 samples were analyzed that did not undergo the thermal decontamination procedure.
  - To verify the non-regulated status for chopped shipping and firing tubes, and additional 58 chopped shipping and firing tubes were sampled and analyzed. Because 3 of the 58 chopped shipping and firing tubes contained PCB concentrations greater than 50 ppm, and additional 88 chopped tube samples were analyzed.
  - In preparation for the CAMDS Trial Burn and future trial burns, 2,000 matted shipping and firing tubes from TEAD were sampled.
  - Over 2,200 shipping and firing tubes have been sampled, including those from thermally decontaminated tubes. When the samples from thermally decontaminated tubes are disregarded, then the database only consists of rockets lots stored at TEAD. The number of tubes sampled decreases from 2,231 to 2,173 with the sample attributable to 27 rocket lots. Twenty of these samples are from the painted variety.
  - 169 chopped shipping and firing tubes were sampled. 22 samples were from thermally decontaminated tubes and were not included in the statistics. 3 of the 147 tubes analyzed contained PCBs greater than 50 ppm.
  - The sampling of the 2,000 matted shipping and firing tubes showed a bimodal distribution. One pool of data indicated shipping and firing tubes less than 50 ppm. The other pool indicated concentrations greater than 2,000 ppm. 43% was <50 ppm, while 57% was greater than 2,000 ppm.
  - The study did not establish a "mean" for the entire batch of matted tubes analyzed. "Means" were established for the matted tubes that measured >2,000 ppm. A "mean" was not established for matted tubes that measured <25 ppm.

#### **TSCA STATISTICAL ANALYSIS FOR PBCDF**

Since the AEHA study did not have specific samples taken from the PBCDF stockpile, PBCDF presented an approach to use 2,700 ppm PCBs as a nominal value for their shipping and firing tubes. 71% of the shipping and firing tubes at PBCDF are matted, 4% are matted/coated, and 25% are coated.

The EPA evaluated the 147 chopped shipping and firing tubes from the AEHA study and determined that the chopped tubes are estimated to have 67 ppm PCBs (based on 3 of the 147 samples being greater than 50 ppm - 84, 4500, 4500).

The EPA evaluated the 2,000 samples from the AEHA study and estimated a mean for the matted tubes of 1,966-ppm. Because all 219,522 tubes were not sampled, uncertainty regarding the true mean value exists. In order to accommodate the uncertainty on the mean, UMCDF proposes the standard error of the mean (40-ppm) for the 2,000 samples be added to the mean to derive a nominal value of 2,006-ppm.

If PBCDF chooses to use a single mean regardless of the type of tube, the EPA estimated a concentration of 1,484 ppm based on the types of tubes currently in storage at PBCDF.

In addition, the report states, "All the means listed in Table 4 above achieve six nines in the DRE equation provided for this project. In fact, the DRE equation as presented with the nominal values of 40 rockets/hour and maximum detection limit of 0.5 achieves six nines for nominal PCB values as low as 42 ppm."

#### **CONCLUSION FOR UMCDF**

Based on the AEHA study evaluated, the most technically justifiable approach to establishing a PCB concentration for matted shipping and firing tubes to support the DFS ATB is to conduct sampling of matted tubes in the UMCDF stockpile and treat the tubes with concentrations >2,000 ppm PCBs during the ATB. This was done in support of the CAMDS DFS Trial Burn. However, due to safety, time, and cost considerations, it is impractical to conduct PCB sampling of the UMCDF matted shipping and firing tubes. The UMCDF proposes to utilize the nominal concentration established based on the statistical analysis of the 2,000 matted shipping and firing tubes sampled from the TEAD stockpile and documented in the AEHA study. Based on the statistical analysis conducted by the EPA for the PBCDF, in conjunction with taking account for the standard error of the mean (40 ppm) for the 2,000 samples, a nominal value of 2,006 ppm was derived. Therefore, it is proposed that 2,006 ppm PCBs be utilized to represent the matted shipping and firing tubes at UMCDF for use in determining the DRE during DFS exhaust gas testing.



## **Enclosure 2**



### **Statistical Analysis of PCB Concentration in GB M55 Rocket Tubes**



## **Inventory and Storage Configuration**

The UMCD storage igloos containing the M55 GB rocket S&F tubes were inspected via a walk-down in August 2004 to determine the quantity of each type of tube contained within a particular igloo. Twenty-five igloos were included in the walk-down. These igloos represent over half (approximately 51 percent) of the total inventory of rocket tubes at the UMCD. As such, the inventory was much more than just a random sampling of the igloos. Although not a complete census, the inventory is considered highly representative of the remaining half of the inventory.

The walk-down results indicated that igloo contents varied, with some igloos containing one, two, or all three types of rocket S&F tubes. The walk-down indicated further that, for those igloos containing two or more types of rocket S&F tubes, the tubes were not segregated by type. Observers found the tubes were stored on pallets in a random assortment. This means that a pallet could contain a mixture of two or three types of rocket tubes, as opposed to a segregated arrangement where each pallet contained a particular type of rocket tube.

The implication from the walk-down observations is that, when the tubes are retrieved for incineration, a random assortment of tube types will be sent to the incinerator at any particular time. For processing and tracking purposes, the development of a "nominal value" for all tubes would streamline efficiency, improve record keeping, and decrease operating costs.

## **M55 GB Rocket S&F Tube Concentration**

The three types of GB M55 rocket S&F tubes (chopped, matted, and matted/coated) each contain a different level of PCB contamination based on the United States Army Environmental Hygiene Report titled, "Assessment of the Occupational Health, Environmental and Regulatory Impact of Polychlorinated Biphenyls (PCBs) Contained in the M441 Shipping and Firing Tube (USAEHA Project No. 37-26-1345-86)". The chopped tubes contain approximately 25-ppm PCBs. This level falls below the TSCA regulated limit for PCBs of 50-ppm. Therefore, these rocket tubes are not considered to be regulated items under the TSCA. The matted tubes contain approximately 2006-ppm PCBs and are regulated under TSCA. Similarly, the matted/coated tubes contain approximately 6441-ppm PCBs and are regulated under TSCA.

Table 1 displays a summary of the number of each type of tube that is stored in each igloo. Table 1 indicates that nine igloos contain exclusively chopped tubes, 13 igloos contain both chopped and matted tubes, and that the remaining three igloos contain all three types of rocket tubes (chopped, matted, and matted/coated).

UMCDF Storage Igloos for S/F Tubes	
Types of Tubes	Number of Igloos Containing Each Tube Type
Chopped	9
Chopped + Matted	13
Chopped + Matted + Mat/Coated	3

Table 1

Table 2 summarizes the PCB contamination in the 25 igloos at the UMCDF. Column one lists the name of each of the 25 igloos housing rocket tubes. Columns two, three, and four each display the number of rocket tubes in the igloo for chopped, matted, and matted/coated respectively. Column five lists the total number of rocket tubes of all types that are stored in each igloo. In column six, the total relative PCB load is listed.

Igloo	Chopped	Matted	Matted/Coated	Total Tubes	PCB Burden (by Igloo)
K1843	418	1398	136	1952	3,690,814
K1846	423	1549	0	1972	3,117,869
K1870	986	1497	0	2483	3,027,632
K1847	662	1301	0	1963	2,626,356
K1844	684	1297	0	1981	2,618,882
K1845	817	1162	0	1979	2,351,397
K1872	1464	1021	0	2485	2,084,726
K1860	1337	510	132	1979	1,906,697
K1871	1755	715	0	2470	1,478,165
K1848	1926	590	0	2516	1,231,690
K1828	1502	486	0	1988	1,012,466
K1957	1731	132	89	1952	881,316
K1833	1975	328	0	2303	707,343
K1861	1686	267	0	1953	577,752
K1837	1848	120	0	1968	286,920
K1863	1899	28	0	1927	103,643
K1849	2517	0	0	2517	62,925
K1851	2434	0	0	2434	60,850
K1830	2425	0	0	2425	60,625
K1850	2417	0	0	2417	60,425
K1831	2286	0	0	2286	57,150
K1899	2160	0	0	2160	54,000
K1836	2123	0	0	2123	53,075
K1829	1990	0	0	1990	49,750
K1856	1939	0	0	1939	48,475

Table 2

The total PCB calculation was obtained by multiplying the number of tubes of a particular type by the average PCB concentration in each type of tube. For example, in igloo K1856, only chopped tubes exist. Since chopped tubes contain 25-ppm PCBs and there are 1939 tubes in the igloo, the total PCB burden is calculated as  $(25)(1939) = 48,475$ .

Table 2 shows that the lowest PCB contaminations are associated with the igloos containing only chopped tubes. All nine of the exclusively chopped-tube igloos fall at the bottom of the list. Another significant feature of Table 2 is that it shows that the highest PCB contaminations do not necessarily correspond to igloos with the highest concentration rocket S&F tubes (matted/coated).

Whereas the igloo with the highest PCB contamination does contain all three types of rocket tubes, the remaining igloos with all three types fall in the eighth and twelfth ranks. Six igloos housing only chopped and matted tubes exceed the burden in igloo K1860 (chopped, matted, and matted/coated), while nine igloos containing only chopped and matted tubes exceed the burden in igloo K1731 (chopped, matted, and matted/coated). Thus, the condition that an igloo contains matted/coated rocket tubes can be considered coincidental and should not be considered a driving factor in feed rate or emissions management.

Because rocket S&F tubes are distributed randomly on pallets within an igloo and the igloos with the highest PCB contaminations are typically not the igloos with the greatest PCB contamination, the chance that PCB emissions could surge is minimized. This also implies that any feed rate or emissions management is better served by tracking total igloo burden of PCBs than by focusing on igloos with matted/coated tubes.

### **Initial Incineration Plan**

UMCDF began the GB M55 rocket S&F tube incineration process by incinerating the tubes contained in igloos K1829, K1830, and K1831, which are scheduled for completion in 2004. These igloos contain only chopped rocket S&F tubes containing less than 50-ppm PCBs and are therefore not regulated under TSCA. Subsequently, UMCDF will proceed with the destruction of GB M55 rocket S&F tubes in the remaining igloos.

Table 3 posts information similar to that shown in Figure 2, but with some slight modifications. Because the rocket S&F tubes igloos K1829, K1830, and K1831 are expected to be incinerated prior to the approval of the recommended nominal value, they should not contribute to the calculation of the nominal value for PCBs. Therefore, igloos K1829, K1830, and K1831 have been excluded from Table 3. Also, Table 3 displays total numbers of GB M55 rockets of each type in the igloos. For example, there are 34,703 chopped rocket S&F tubes, 12,401 matted S&F rocket tubes, and 357 matted/coated rocket S&F tubes, composing 73 percent, 26 percent, and 0.75 percent of the total population respectively.

Table 3 shows that approximately 28,000,000 PCB burden units are distributed amongst approximately 50,000 GB M55 rocket S&F tubes. This produces an average or nominal contamination of approximately 591-ppm per tube. Actual contaminations per igloo range from 25-ppm in igloos K1856, K1836, K1899, K1850, K1851, and K1849 to 1891-ppm in igloo K1843 (Table 4). Actual contaminations range from about 0.042 to 4.16 times the nominal value of 591-ppm.

Igloo	Chopped	Matted	Matted/ Coated	Total Tubes	PCB Burden (by Igloo)
K1843	418	1398	136	1952	3,690,814
K1846	423	1549	0	1972	3,117,869
K1870	986	1497	0	2483	3,027,632
K1847	662	1301	0	1963	2,626,356
K1844	684	1297	0	1981	2,618,882
K1845	817	1162	0	1979	2,351,397
K1872	1464	1021	0	2485	2,084,726
K1860	1337	510	132	1979	1,906,697
K1871	1755	715	0	2470	1,478,165
K1848	1926	590	0	2516	1,231,690
K1828	1502	486	0	1988	1,012,466
K1957	1731	132	89	1952	881,316
K1833	1975	328	0	2303	707,343
K1861	1686	267	0	1953	577,752
K1837	1848	120	0	1968	286,920
K1863	1899	28	0	1927	103,643
K1849	2517	0	0	2517	62,925
K1851	2434	0	0	2434	60,850
K1850	2417	0	0	2417	60,425
K1899	2160	0	0	2160	54,000
K1836	2123	0	0	2123	53,075
K1856	1939	0	0	1939	48,475
Total	34,703	12,401	357	47,461	28,043,418
%	73%	26%	0.75%	100%	100%
Average PCB Concentration (ppm)				591	

Table 3

<b>Igloo(s)</b>	<b>PCB Burden (by Igloo)</b>	<b>Average PCBs (ppm)</b>
K1843	3,690,814	1891
K1846	3,117,869	1581
K1870	3,027,632	1219
K1847	2,626,356	1338
K1844	2,618,882	1322
K1845	2,351,397	1188
K1872	2,084,726	839
K1860	1,906,697	963
K1871	1,478,165	598
K1848	1,231,690	490
K1828	1,012,466	509
K1957	881,316	451
K1833	707,343	307
K1861	577,752	296
K1837	286,920	146
K1863	103,643	54
K1849	339,750	25
K1851	60,850	25
K1850	60,425	25
K1899	54,000	25
K1836	53,075	25
K1856	48,475	25

Table 4

## Summary and Conclusions

Use of a nominal value for monitoring and recording purposes during PCB incineration in the DFS was introduced at the UMCDF via conditions 5.a and 5.b of the TSCA permit, which applied to the disposal of M55 rockets. Using a nominal value allows the recording and verification processes to be streamlined and efficient during the destruction process. Given the success of the use of nominal values at other chemical demilitarization facilities, the UMCDF has analyzed the feasibility of expanding the benefits of the approach to the incineration of rocket tubes.

Tube types in over 50,000 GB rocket tubes residing in 25 igloos were inventoried and evaluated. This represents over half of the GB rocket tubes at the UMCD and constitutes a highly representative assessment of the characteristics that may be found in these and remaining igloos. Based on this large sample, predictions can be made with high confidence regarding the remaining igloos and rocket tubes.

The analysis has identified several factors and conditions that contribute to the conclusion that a nominal value for PCBs in GB rocket tubes benefits the UMCDF operation. In the business, operations, and regulatory arenas, three items stand out. First, as stated above, there is a precedent for employing this type of approach. This eliminates the potential obstacle of justifying a previously untried procedure. Second, since it is required by permit, all parties are familiar with the concept and implementation. Third, use of a

single value will simplify recordkeeping and verification during incineration. Keeping track of PCB concentrations during incineration for individual rocket tubes or even groups of rocket tubes would be a time-consuming effort. Subsequent validation and verification of source materials would also have represented a significant and costly effort.

On the statistical side, several items contribute to support the implementation of a nominal value. First, due to the largely random dispersment of matted and matted/coated tubes within individual igloos, average PCB concentrations in feed to the DFS are relatively stable. Second, because of this, unexpected surges in PCB concentrations are minimized or eliminated. Third, the analysis has demonstrated that PCB loads to the incinerator are a function of total igloo content of PCBs. This provides the opportunity to manage feed rates and quantities in accordance with the permit using an objective approach. Although igloos containing the highest concentration tubes (matted/coated at 6441-ppm PCBs) can contain high overall levels of PCBs, these igloos do not necessarily create the greatest load on the furnace. With this fact in mind, proper and appropriate sequencing of igloos may be performed.

In conclusion, the use of a "nominal value" offers an opportunity to simplify PCB characterization, improve recordkeeping, and accelerate the incineration process. The results of the statistical analysis performed indicate that a single "nominal value" of approximately 591-ppm per tube may be used effectively to represent the PCB contamination on the DFS during GB M55 rocket shakedown, post-trial burn, and normal operational periods when emissions testing for DRE demonstration is not being performed. Therefore, UMCDF proposes to utilize 591-ppm PCBs as the quantity per GB M55 rocket S&F tube fed to the DFS during normal operations. During exhaust gas emissions sampling periods (Trial Burns, shakedown emissions testing, etc.), the quantity of PCBs recorded in the operating record will be based on the type of S&F tubes treated during the sampling period.



## **Enclosure 3**

### **Updated Estimate of Quantity of PCB to be Treated**

## UPDATED ESTIMATE OF QUANTITY OF PCB TO BE TREATED

Permit Condition	TSCA Approval Text	Required Information
1.a.(2)C	Estimates of the amount and type of PCB (Arcolar, etc.) to be treated and estimates of the concentration of PCBs in the material. The estimates shall be based on analytical data from a representative sample of the material to be disposed of and/or historic analytical data from similar material	<p><u>Type of PCB to be treated:</u> Arochlor 1254</p> <p><u>Estimated PCB concentration in PCB articles:</u></p> <ul style="list-style-type: none"> <li>Chopped, matted, and/or matted/coated GB rocket tubes: 591 ppm (nominal value). A nominal value for VX rocket tubes will be established separately.</li> <li>Umatilla Chemical Depot (UMCD) Secondary Waste: This waste consists of a mixture of the tube types identified above stored with various dunnage (i.e. wood, paper). Therefore the estimated concentration will be what is identified above for the various tubes types.</li> </ul> <p><u>Estimate of the amount to be treated:</u></p> <ul style="list-style-type: none"> <li>Total estimate of the amount in rocket shipping and firing tubes: 390 kg Estimate of the amount of PCB to be treated is based on a nominal PCB concentration of 591 ppm. The amount to be treated was determined by using the following calculation:  <math display="block">\text{Total number of GB and VX rockets (105,965)} \times \text{weight of the rocket tube (13.73 lbs.)} \times \text{nominal PCB concentration (591 ppm)} = 390 \text{ kg}</math> </li> <li>Total estimate of the amount of PCB in UMCD secondary waste is based on a nominal PCB concentration of 591 ppm. The amount to be treated was determined using the following calculation: <ol style="list-style-type: none"> <li>Tubes only: 0.26 kg  <math display="block">\text{Total number of tubes (71)} \times \text{weight of rocket tube (13.73)} \times \text{nominal PCB concentration (591 ppm)} = 0.26 \text{ kg}</math> </li> <li>Mixed waste (tubes and dunnage): 16kg  <math display="block">\text{Total weight of the mixed waste (6,663 lbs)} \times \text{worse case scenario for PCB concentration (591 ppm)} = 1.79 \text{ kg}</math> </li> </ol> </li> </ul>